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NATIONAL RANGE, WILDLIFE, AND FISH RESEARCH WORKSHOP: REPORT

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A REPORT OF THE

NATIONAL RANGE, WILDLIFE, AND FISH

RESEARCH WORKSHOP

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INTRODUCTION

It has been 10 years since the Forest Service range, wildlife, and fish research personnel met in Flagstaff, Arizona. Therefore, the 1978 workshop at Fort Collins was timely to:

a. Review and coordinate current range, wildlife, and fish research activities.

b. Relate current Forest Service range, wildlife, and fish research to recent efforts by regional and national planning groups, the National Program of Research for Forests and Associated Rangelands, and problems identified by other user and special interest groups.

c. Develop a framework for future research programs in range, wildlife, and fish.

The RM Station hosted the meeting in the Craddock Building, November 27-December 1, 1978, Fort Collins, Colorado. Eighty-four scientists, administrators, and managers representing private, State, university, and Federal organizations (Appendix 1), participated in the national workshop to accomplish the following tasks:

Task 1: Review all selected problems in each RWU which identify a range, wildlife, or fish research problem and put it into the framework of animals and land use (Figure 1).

Task 2: Review all problems in each cell of the framework (Figure 1) and identify opportunities for coordination of research within, as well as among Stations.

Task 3: Compare problems selected by RWU's with problems selected by:
(a) the National Program of Research for Forest and Associated Rangelands;
(b) regional planning groups (RPG II Range and Wildlife Task Forces); and
(c) special interest groups.

Task 4: Prepare alternative problem selections for each RWU for 1985 at four levels of funding.

Task 5: Identify one to three major thrusts for research in each work group for 1985 that addresses the highest priority problem(s).

Task 6: Critique the workshop.

Figure 1. — A framework for displaying range, wildlife, and fish research programs of the Forest Service

ANIMALS/ HABITAT	CATEGORIES OF LAND USE			
	FOREST	RANGELAND	AGRICULTURE	URBAN
Livestock				
Wildlife				
Fish				
Livestock Wildlife Fish Interaction				

Fish Research Funds (515) in FY 1978

Figure 2

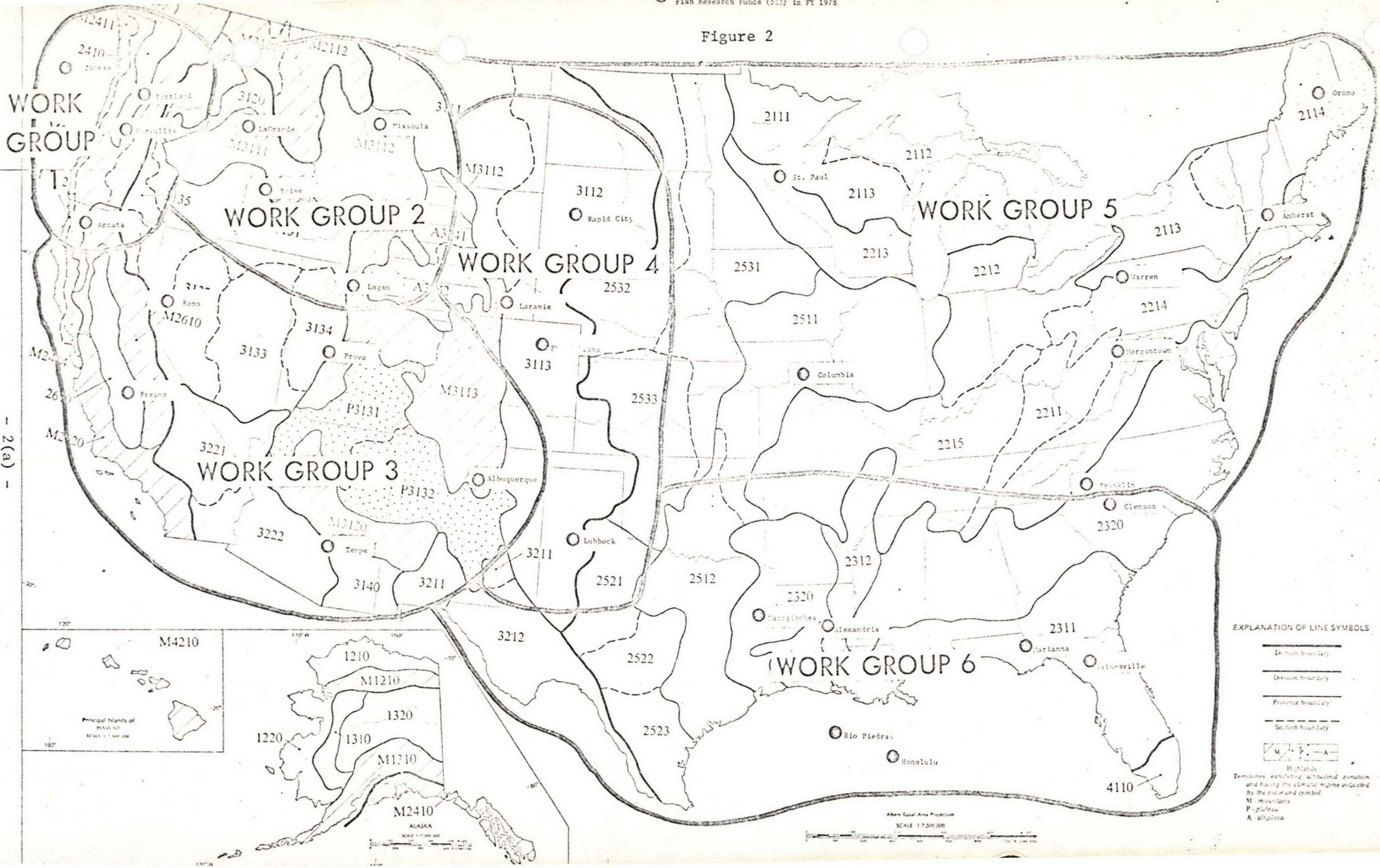

Fig. 3 Work Units Within Six Work Groups

Work Group	Location	RWU's	Chairperson
Work Group 1: Pacific Northwest and Coastal Alaska	Juneau, AK	PNW-1652	Meehan
	Portland, OR	PNW-4201	
	Corvallis, OR	PNW-1251	
	Corvallis, OR	PNW-1653	
	Arcata, CA	PSW-1651	
Work Group 2: Northwestern	La Grande, OR	PNW-1701	Muggler
	La Grande, OR	PNW-1704	
	Missoula, MT	INT-1705	
	Boise, ID	INT-1651	
	Logan, UT	INT-1751	
Work Group 3: Southwestern	Tempe, AZ	RM-1710	Patton
	Fresno, CA	PSW-1701	
	Fresno, CA	PSW-1702	
	Provo, UT	INT-1752	
	Provo, UT	INT-1703	
	Albuquerque, NM	RM-1651	
	Reno, NV	INT-1753	
Work Group 4: Rocky Mountain	Rapid City, SD	RM-1752	Bjugstad
	Laramie, WY	RM-1712	
	Ft. Collins, CO	RM-1251	
	Ft. Collins, CO	RM-1751	
	Ft. Collins, CO	RM-4151	
	Ft. Collins, CO	HERBARIUM	
	Lubbock, TX	RM-1713	
Work Group 5: Northeastern	Orono, ME	NE-1151	Crawford
	Amherst, MA	NE-1751	
	Warren, PA	NE-1152	
	St. Paul, MN	NC-1702	
	Columbia, MO	NC-1701	
	Morgantown, WV	NE-1702	
	Franklin, NC	SE-1651	
Work Group 6: Southern, Hawaii, and Puerto Rico	Alexandria, LA	SO-1701	Pearson
	Nacogdoches, TX	SO-1751	
	Marianna, FL	SE-1152	
	Clemson, SC	SE-1702	
	Gainesville, FL	SE-1153	
	Rio Piedras, PR	SO-1152	
	Honolulu, HI	PSW-1752	

BACKGROUND

The range, wildlife, and fish research program in the Forest Service is defined as those work units which receive functional (513) funding. Thirty-eight RWU's at 31 locations received 513 funding in FY 1978. The location of each work unit is shown in Figure 2. which displays the six work groups by combining work units with similar ecological characteristics. Figure 3 shows locations and RWU numbers within each work group.

In FY 1978, 15 of the 38 RWU's were range, wildlife, and fish habitat research functional units (1700). Eight of the work units were multifunctional and led by range, wildlife, and fish habitat research (1700). The remaining 15 RWU's were multifunctional and led by a function other than range, wildlife and fish habitat research (1100-Timber, 1600-Water, etc.). In FY 1979, the range, wildlife, and fish research budget at the appropriate level is $8,645,000. Approximately 28.6 percent is allocated to range research; 56.4 percent to wildlife; 13.5 percent to fish; and 1.5 percent to other research, including techniques research and the Herbarium at Fort Collins, Colorado.

FY 1979 studies include research on 20 threatened or endangered animals, including 3 fishes, 6 mammals, and 11 birds. The expenditure for threatened and endangered species research (appropriation level) is 13 percent, or $1,028,746, of which $94,796 is being spent for endangered plant research. We are conducting research on threatened and endangered species at 10 locations involving 10 RWU's.

Seventy-five research scientists (GS-12 and above) are in range, wildlife, and fish research. In FY 1979, the average range, wildlife, and fish research scientist is 50 years of age, has 25 years of experience, is a GS-13, and has been in location approximately 9 years.

In FY 1978, range, wildlife, and fish scientists averaged 2.1 publications per scientist year. Between 1973 and 1976, 81 percent of the publications was written for a technical audience and 19 percent for a general audience. Thirty-three percent of these publications was applicable to Western range, 25 percent to Western forests, 8 percent to the Great Plains, 13 percent to the Northeast, and 21 percent to the South/Southeast.

RESULTS

Task 1. Review all selected problems in each RWU which identify a range, wildlife, or fish research problem and put it into the framework of animals and land use (Figure 1).

Range, wildlife, and fish research scientists in the 38 RWU's selected 87 problems for study (See Appendix 2 for problem statements). These problems are concerned with wildlife, fish, and livestock on forest land, rangeland, agriculture, and urban areas. Many of the problems include several categories of animals and land use. For example, on forest land, 77 problems involve wildlife; 16, fish; 28, livestock; and 37 deal with the interactions of wildlife, fish or livestock (Figure 4). On rangelands, 34 problems involve wildlife; 8, fish; 19, livestock; and 25, the interactions of wildlife, fish, and livestock. On agricultural lands, 14 problems deal with wildlife; 2 with fish; 6 with livestock; and 5 with interactions. On urban lands, 8 problems concern wildlife; 3, fish; 2, livestock; and 4, interactions.

Figure 4. -- Range, wildlife, and fish research problems selected by Forest Service scientists

AMIMALS/ HABITAT	CATEGORIES OF LAND USE			
	FOREST	RANGELAND	AGRICULTURE	URBAN
Livestock	28	19	6	2
Wildlife	77	34	14	8
Fish	16	8	2	3
Livestock Wildlife Fish Interaction	37	25	5	4

Task 2. Review all problems in each cell of the framework and identify opportunities for coordination of research within as well as among Stations:

Work Group 1 -- Pacific Northwest and Coastal Alaska

PNW-1652 appears to be addressing two problems under the current RWUD Problem No. 2, and these should be considered separately:

a. Determine habitat requirements of forest wildlife species in southeastern Alaska and develop recommendations for adapting forest management practices to their habitat needs.

b. Understanding the plant/wildlife habitat relationships and processes of wetlands along the Alaska coast.

Work Group 2 -- Northwestern

Coordination is needed between PNW-1701-6[1/] and INT-1651-2; between PNW-1701-2 and PNW-1704-1 and 2; between INT-1651-2 and PNW-1701-1 and 2; and between PNW-1704-3 and PNW-1701-1 and 2.

Work Group 3 -- Southwestern

RM-1710 and PSW-1702 need to coordinate research on wildlife habitat guidelines in New Mexico, Arizona, and California. PSW-1701 and PSW-1702 need to coordinate activities on wildlife/livestock interaction.

Work Group 4 -- Rocky Mountain

There are many opportunities to coordinate research activities throughout the Rocky Mountain area:

Wildlife

RM-1251 with RM-1713 -- spruce and fir
RM-1712 with PNW-1701 -- ponderosa pine
RM-1713 with RM-1710 -- quail
RM-1713 with RM-1704 -- agriculture
RM-1751 with RM 1752 and RM-1710
RM-1752 with RM-1713 -- plains deer and waterfowl
RM-4151 with all RWU's

1/ PNW 1701-6 means Pacific Northwest Station, RWU 1701, Problem No. 6.

Livestock

INT-1751 with RM-1251 -- forest
INT-1751 with RM-1751 -- urban
RM-1752 with RM-1751 and INT-1651 -- forest range
RM-4151 with all RWU's

Fish

RM-1751 with INT-1651
RM-4151 with all RWU's

Work Group 5 -- Northeastern

Partipants from Group 5 suggest the following procedure to improve coordination among RWU's:

1. Route study proposals and summaries to all work units and cooperators.

2. Route study plans and progress reports to appropriate scientists.

3. Broaden the scope of technical review of proposed studies.

4. Broaden the scope of functional reviews of projects to include other projects, Stations, and universities.

5. Informal field trips and workshops for Forest Service scientists and cooperators.

6. Develop an annual index of current studies by subject area.

7. Improve CRIS, bring up to study level for all Forest Service, and insist on currency and accuracy.

Work Group 6 -- Southern, Hawaii, and Puerto Rico

Opportunities for coordination among units in this area include:

SO-1701 with SO-1752 and SE-1153
-- site preparation and vegetation manipulation.
SO-1701 with SO-1751, SE-1152, SE-1153 and PSW-1752
-- livestock interactions.
SO-4101, SE-4101, SO-1302, SO-1701, SO-1751, SE-1702, RM-4151,

PSW-1752, SE-1651, PNW-1701, RM-1710 and PSW-1702
-- habitat and population techniques measurements.
SO-1751, SO-1701, SE-1702, SE-1153, NC-1701, PSW-1752 and SE-1651
-- effects of timber stand condition on wildlife, food and cover.
SO-1751, SE-1702, SO-1701, SO-1152,, PSW-1752, and NC-1701
-- habitat requirements of senstive species including threatened and endangered.

Task 3. Compare problems selected by RWU's with problems selected by: (a) the National Program of Research for Forest and Associated Rangelands, (b) Regional planning groups (RPG II Range and Wildlife Task Forces), and (c) special interest groups.

Work Group 1 -- Pacific Northwest and Coastal Alaska

Of the top ten priority wildlife and fish research problems identified in the National Program for Research on Forest and Associated Rangelands in 1977-78, Work Group 1 is working on eight (Figure 5). The two problems not being studied by Forest Service researchers are:

1. Developing and evaluating prescribed burning techniques for improvement of wildlife and livestock habitat.

2. Determining the effects of range improvement practices on fish and wildlife habitat.

Special interest groups identified two additional problems (Figure 5) currently not being studied by Work Group 1:

1. Methods for classifying and inventorying fish and wildlife habitats.

2. Methods for effective technology transfer.

Work Group 2 -- Northwestern

Work Group 2 concluded that they were addressing, to some degree, all of the problems identified in the national and regional workshops and by special interest groups, except classification and inventory methods for wildland resources.

Figure 5
Research Priorities Compared by Source

Problems	Priority: RWF Work Groups (out of 10)	Priority: RWF Special Interest Groups (out of 14)	Priority: National Program of Research (out of 40)
Habitat requirements and species-habitat interaction of vertebrate wildlife and threatened/endangered plant species.	1	11	4
Effects of forest management practices on vertebrate wildlife population.	2	1	7
Interactions of livestock, vertebrate wildlife, recreation, and riparian ecosystems.	3	3	6
Cost effective methods of improving quality of forest and rangeland for livestock, wildlife, fish, wood, recreation, watershed, and related uses.	4	6	2, 3
Information synthesis and models of forest and rangeland ecosystems.	5	NL 1/	30
Classification and inventory of environmental units for resource management.	6	9	NL
Techniques to provide for nonconsumptive use of wildlife.	7	5	21
Effects of forest management practices on aquatic and estuarine ecosystems.	8	4	23

1/ NL = Not Listed.

Figure 5 (Continued)
Research Priorities Compared by Source

Problems	Priority		
	RWF Work Groups (out of 10)	RWF Special Interest Groups (out of 14)	National Program of Research (out of 40)
Techniques to inventory and classify timber, vertebrate wildlife, and range resources.	9	12	26
Assess social and economic values of all wildland resources.	10	NL	3
Effects of forest and range management practices on habitats of nongame birds and small mammals.	2	2	33
Effects of air, water, and noise pollution and sludge disposal on fish, wildlife, recreation, and vegetation resources.	NL	7	17,20
Effects of timber management practices on production of cavities for cavity-using wildlife.	NL	8	NL
Isolate variables that reliably estimate impacts and effects of forest and rangeland management practices on natural resources.	NL	10	NL
Develop people-management techniques as they apply to use of natural resources.	NL	13	15,25
Impacts of natural and intentional fire on wildland ecology.	NL	14	1

1/ NL = Not Listed

Work Group 3 -- Southwestern

Work Group 3 concluded that all the national and regional problems were currently being studied by the Forest Service. Special interest groups identified three problems not currently being studied by Forest Service researchers:

1. Socioeconomic values of wildlife, fish, and livestock.

2. Urbanization impacts on wildlife and livestock.

3. Research on energy efficient grazing management practices.

Work Group 4 -- Rocky Mountain

Work Group 4 has been conducting limited research on wildlife habitat associated with privately owned crop lands; methods of revegetating disturbed lands using native or introduced plant species; requirements for successful germination, emergence, and stand establishment of native plants; techniques for revegetating disturbed rangelands; and developing prescribed burning techniques to improve wildlife resources.

The following changes were recommended:

1. Reorganize to emphasize research on suburban and urban wildlife in the Great Plains.

2. Reorganize to decrease big game research and put more effort on livestock grazing research in forest and rangeland areas.

3. Even at the expense of using specific scientists to do the job, research needs to put more emphasis on technology transfer. The Stations need counterparts in offices of midmanagement (RO's). This effort by scientists should be recognized by panel evaluation members when scientists and their positions are reviewed under the Research Evaluation Guide.

Work Group 5 -- Northeastern

The ten highest priority national research needs in fish and wildlife that are applicable to the East are covered by present RWU problems. Research efforts should be increased on aquatic and riparian ecosystems to enhance fish and wildlife habitat and on multiple use management systems in the North/Northeast.

Work Group 6 -- Southern, Hawaii, and Puerto Rico

Work Group 6 does not recommend any changes in Forest Service problem selection to meet the priority problems identified by national/regional and special interest groups. There are two areas that are currently not covered by Forest Service research: (a) warm water fish and (b) recreation impacts on other resources.

Task 4. Prepare alternative problem selections for each RWU for 1985 at four levels of funding (+10%, -10%, -50% and +100%).

Work Group 1 -- Pacific Northwest and Coastal Alaska

A change of 10 percent from the FY 1978 funding level would increase or decrease the total effort by 10 percent in the selected problems. A 50 percent decrease in FY 1978 funding would decrease the level of effort in each problem area, thereby increasing the amount of time required to produce results. A 100 percent increase in FY 1978 funding would result in the following changes: PNW-1705 increase effort on present problems by 25 percent and add one additional problem--develop methods for classification and inventory of anadromous fish habitat; PNW-1652 increase effort in present problems by 25 percent, add one additional problem -- habitat requirements and influences on forest management on brown bear and Coastal Alaska; PNW-4201, add one additional problem -- to develop methods for evaluating the economic significance of fish and wildlife populations within various forest and rangeland management practices; and PSW-1651, add one additional problem -- develop methods for assessing current anadromous fish habitat enhancement projects and provide better techniques for enhancing anadromous fish habitat.

Work Group 2 -- Northwestern

A 10 percent change in funding from the FY 1978 level would be handled by increasing or decreasing the amount of effort in selected problems. No problems would be deleted. A 50 percent reduction in FY 1978 funding would be extremely difficult to hypothesize at this point. In all probability, complete work units would be eliminated. Major problems would also have to be deferred or eliminated. This would be determined on the basis of scientific capability remaining in each of the work units. A 100 percent increase in funding would not appreciably alter the current problem selection but would accelerate progress in problem solution, and mountain grassland research in the Northern Rocky Mountains would be reactivated.

Work Group 3 -- Southwestern

+10 percent

RM-1710 Increase Problem 3 research on T&E species in riparian communities.
RM-1651 Add two additional native species for study.
INT-1753 Increase effort on Problem 1 - Resource Potentials.
PSW-1702 Increase Problem 2 research on T&E species.
INT-1752 Increase effort to analyze long term effects of vegetational manipulation of pinyon-juniper type.
PSW-1701 Increase efforts on Problem 4.
INT-1703 Study grazing systems on Great Basin BLM allotments -- Problem 3.

-10 percent

RM-1710 Reduce Problem 1 research on deer and elk.
RM-1651 Reduce the number of species we are working with.
INT-1753 Reduce research effort on Problem 1 - Resource Potentials.
PSW-1702 Reduce Problem 3 research on foothill woodland ecosystems.
INT-1752 Reduce effort on Problem 2.
PSW-1701 Reduce research efforts on Problem 3.
INT-1703 Use volunteer help to assist in getting the backlog of data published.

-50 percent

RM-1710 Eliminate Problems 1 and 2 on game, small game, and nongame species. 2 SY's.
PSW-1701 Eliminate Problems 2, 3, and 6 and reduce effort on Problem 1 by 50 percent, slightly reduce efforts on 4 and 5 to match budget.
INT-1752 Eliminate Program 4, reduce effort on Problem 2 and to a lesser extent Problem 3.
PSW-1702 Eliminate Problems 1, 2, and 3 and scale down effort on 4 and 5 to meet reduction.
INT-1703 Cancel the project, but maintain the Desert Experimental Range on caretaker status under the supervision of GS-454-6.
INT-1753 Reduce research effort 50% equally on the two problems.

+100 percent

RM-1710 Reactivate and/or initiate range research on livestock and wildlife interrelations in ponderosa pine, mixed conifer, chaparral, and pinyon-juniper and research on grazing systems in riparian areas.

RM-1651 Begin studies on the effects of various grazing systems on range, wildlife, and watershed values in semiarid areas.

INT-1753 Begin work on the economics of pinyon juniper management alternative.

PSW-1702 Add problem specifically geared to wildlife/riparian relationships.

INT-1752 Increase effort on determining role of native shrubs in successional development of forest, range, riparian habitats including: nitrogen fixation; mycorhizal associations; productivity; nutrient cycling; effects of manipulation; effects of utilization; and opportunities for establishing shrubs to achieve specific range, wildlife, and aquatic habitat objectives.

PSW-1701 Increase effort on Problems 4 and 5 to determine timber, range, and wildlife interrelationships and values on forest and meadow ecosystems.

INT-1703 Increase research effort on grazing system effects on BIM allotments in the Great Basin.

Work Group 4 -- Rocky Mountain

+10 percent

RM 1752 Expand Problem 2 by 50 percent (1 SY).
RM 1712 Add new problem on nongame.
RM 1251 No change.
RM 1751 Expand Problem 2.
RM 4151 New contracting in Technique Research.
RM 1713 Expand Problem 3.

-10 percent

RM 1752 Reduce Problem 1 by 50 percent (1 SY).
RM 1712 Discontinue Problem 3 and 90% of No 1.
RM 1251 No change.
RM 1751 Discontinue Problem 4.
RM 4151 Reduce contracting in Technique Research.
RM 1713 Discontinue Problem 1.

-50 percent

RM 1752 Discontinue Problem 1 and 50 percent of effort in Problem 3.
RM 1712 Discontinue Problems 1 and 3.
RM 1251 Combine with 1751 and discontinue Problem 1 in 1751.
RM 1751 Terminate and transfer 1 SY to 1251.
RM 4151 Reduce research on classification.
RM 1731 Discontinue Problems 1 and 2.

+100 percent

RM-1752 Increase Problem 2 by 2 SY's and Problem 3 by 6 SY's.
RM-1712 Increase 1 SY in livestock research.
RM-1251 Increase research in forest land wildlife with emphasis on livestock-wildlife interactions.
RM-1751 Increase research on detail habitat descriptions.
RM 4151 Add 1 SY in fisheries or aquatic research with 2 full-time technicians, intensify pilot studies at test locations, and increase user interactions.
RM 1713 Discontinue Problem 1, but add two other problems -- (1) assess interaction of selected agriculture-range practices and wildlife populations in communities on Southern Great Plains and (2) develop habitat management techniques for nongame wildlife in areas of human habitation on Southern Great Plains.

Work Group 5 -- Northeastern

Group 5 approached Task 4 differently than the other groups. The idea of selecting alternative problems for 1985 negates a report on what effects different funding levels would have on current research. Many of the problem areas and unit directions will change by 1985. The full listing of problems listed for 1985 is not included in this summary report but is contained in the Group 5 report. An attempt has been made to summarize the effect of four levels of funding on problem priorities.

+10 percent

NE-1151 Conduct research on deer, moose, and birds with increased effort on basic nutritional requirements.
NE-1751 No change.
NE-1152 Excessive deer browsing is a major problem. Increase research on deer; wildlife and deer; vegetation interactions.
NC-1702 Determine habitat of "key" species in aspen-birch forests and in the reparian zones.
NC-1701 Explore the "niche clustering" concept as a management tool and determine life requirements of sensitive (including T&E) species. Maintain viable cooperative research program.
NE-1702 Maintain an active forest-wildlife research program. Increase work on small woodlot management.
SE-1651 (a) Relate stream organism population characteristics to definable stream attributes.
(b) Study the effects of changes in the stream environment.

-10 percent

NE-1151 Same as with +10 percent except less effort on nutrition.
NE-1751 Decrease extramural research efforts.
NE-1152 Same as for +10 percent except longer problem solution time.
NC-1702 Same as for +10 percent except little or no work in riparian zone.
NC-1701 Same as for +10 percent except less extramural research.
NE-1702 Same as for +10 percent except less work on small woodlots.
SE-1651 Same as for +10 percent with less work on (b).

-50 percent

A 50 percent reduction would drastically effect the program. First, would be the elimination of extramural research programs; then a prioritizing of problems and an elimination of many problem areas.

+100 percent

NE-1151 Develop a viable research effort to determine the potential of the land to produce wildlife on definable site units. Increase efforts on nutritional requirements and the testing of site potentials.
NE-1751 Greatly increase efforts on various publics preception of wildlife and initiate research on bird communities of the northeastern forest types.
NE-1152 Same as for a +10 percent except more intensive with a shorter time needed to solve complex problems.
NC-1702 Same as for a +10 percent with the addition of research on the effects of prescribed burning and on the effects of modifying silvicultural practices.
NC-1701 Same as for +10 percent with the addition of research on the contribution of various riparian habitats to the perpetuation of native vertebrate populations and research on range improvement practices.
NE-1702 Same as for +10 percent with addition of research on aesthetic perceptions of wildlife habitat and other forest management practices.
SE-1651 Same as for +10 percent with increased efforts in (b).

Work Group 6 -- Southern, Hawaii, and Puerto Rico

With a 10 percent increase in funding, time span would continue as planned, completion would be accelerated or new studies initiated. A 10 percent reduction in funding would increase the time needed for completion of existing work. Less intensive measurements would be made in specific studies and no new studies would be initiated. At 50 percent reduction, time necessary for completion would double; no new

problems would be undertaken; extramural research would be eliminated; and some selected problems would be terminated. At 100 percent increase, time span for completion of problems would be accelerated, new studies would be initiated; cooperative-aid studies and cooperative research on technology transfer would accelerate. A 50 percent reduction in FY 78 funds for SO-1751 would eliminate Problem No. 3; SO-1751 would eliminate Problem No. 1; and SE-1702 would eliminate Problem No. 1.

Task 5. Identify one to three major thrusts for research in each group for 1985 that addresses the highest priority problem(s).

Work Group 1 -- Pacific Northwest and Coastal Alaska

Problem 1. Effects of forest management practices on fish and wildlife populations.

Problem 2. Define habitat requirements and species habitat interactions of major fish and wildlife species.

Work Group 2 -- Northwestern

Major thrusts for 1985 - five major problem areas which should receive priority consideration are:

Problem 1. Information synthesis and models of biological and physical systems.

Problem 2. Livestock interactions in riparian systems.

Problem 3. Habitat requirements of wildlife and fish populations.

Problem 4. Classification systems of environmental units for resource management

Problem 5. Information needed to assess aesthetic values and effectively manage nongame species.

Work Group 3 -- Southwestern

High priority problems:

Problem 1. Develop cost effective methods for improving the quality of forest and rangelands for wildlife, livestock, watershed, wood, recreation, and related uses.

Problem 2. Determine habitat requirements of fish and wildlife.

Problem 3. Develop an understanding of the important characteristics and basic ecological functions of riparian and associated habitats, and determine effects of management, mitigation, and rehabilitation on their continued stability and production.

Work Group 4 -- Rocky Mountain

Problem 1. There is a need to assess the interaction between land use practices and wildlife and fish populations and communities in order to identify opportunities for alternative management programs in the Front Range of the Rocky Mountains and Great Plains.

This information is needed by range and forest land managers to conserve natural resources while maximizing production of commodities (lumber, beef, and grains).

Estimated costs would be $3.0 million.

Problem 2. There is a need for research and development of multifunctional inventory, classification, and analysis techniques for an ecological data base.

Use of a multifunctional (ecological) data base and classification system would avoid duplication of effort and develop compatibility between and within functions and agencies. This information is needed by land use planners.

Cost: $1.5 million/year with Forest Service staffing for all functions and coordinating Agency funding for complimentary staff and support.

Problem 3. There is a need to assess the social and economic values of land resource use as a means of identifying opportunities for resource development.

There is a need to evaluate wildlife resources economically so that managers of private lands can realistically give consideration to all renewable natural resources involved when making land use decision.

Estimated costs: This will require 1 SY - Economist at four locations - RM-1752, RM-1251, RM-1713, and RM-1710 or $500,000.

Work Group 5 -- Northeastern

Major thrust: There is a critical need to determine the relationships between forest land management options and the habitats required to maintain diverse populations of terrestrial fauna and flora. Cost: $3.2 million per year.

Priority problems:

Wildlife:

Problem 1. Habitat requirements of specific wildlife, especially nongame birds.

Problem 2. Wildlife census techniques, especially for nongame and sensitive species.

Problem 3. Evaluate habitat management practices, especially for game species.

Fish:

Problem 1. Develop species habitat associations for warm water systems.

Problem 2. Habitat requirements of selected species of warm water fishes.

Problem 3. Rehabilitation of degraded warm water systems.

Livestock:

Problem 1. Socioeconomic evaluation of cattle grazing in southern forests.

Problem 2. Cattle grazing systems in southern pine forests.

Problem 3. Phenology and nutritional qualities of cattle forage.

Plants:

Problem 1. Ecological requirements of T&E plants.

Work Group 6 — Southern, Hawaii, and Puerto Rico

Problem 1. Interrelationship between livestock and wildlife in Southern pine forest.

Problem 2. Effects of Southern pine timber stand condition and management practices on wildlife, their food, and cover.

Problem 3. Effects of timber management practices on riparian and estuarine environments and associated fishes.

Task 6. Critique the workshop.

The workshop was worthwhile. It was well organized and provided a useful form for exchanging ideas and information that hopefully will improve coordination of research. Specific comments follow:

1. Too little time allotted for outside participants to present research needs and priorities.

2. Too much time allotted for Forest Service administrators to present research needs and priorities.

3. Much value seen in the workshop and exchanging ideas, developing perspective, and promoting communication in a national context.

4. Task 1 could have been more profitably done prior to the workshop.

5. Concern expressed that research priorities too often chosen for political reasons rather than for ecological or user needs.

6. Research and progress are already planned very similar to the problems suggested by user groups.

7. The Forest Service may be reaching the limit in planning, i.e., we are spending too much time planning national, regional, Station and work unit efforts.

8. Provided an update on current events from the Washington Office.

9. Allowed good field level participation in the national planning process.

10. Need more participation by National Forest System representatives in range, wildlife, and fisheries in individual work groups.

SUMMARY AND CONCLUSION

1. The basic idea of displaying the research work units by major ecological type, i.e., the six work groups seemed to be useful. It brought together people that are working on problems in similar ecological environments and resulted in a much stronger interaction. There is an opportunity to continue dialogue among RWU's within each work group.

2. Overall planning for the workshop could have been enhanced greatly by mailing materials to participants prior to the workshop and having some of the tasks completed before participants arrived.

3. More time should have been allotted to outside speakers, time should have also been allotted for a show-and-tell by project leaders, and time should have been made available for informal interchanges between workshop participants.

4. Most participants were pleased to have an opportunity to make input into the development of the national range, wildlife, and fish research program.

5. Some range, wildlife, and fish project leaders have a difficult time eliminating or establishing priorities among problems.

6. Problems selected by the national, regional, and special interest groups are extremely general. Problems selected by the Forest Service range, wildlife, and fish research personnel are also general. Therefore, it is extremely difficult to tell whether or not a problem or problem area is actually included or excluded from the research program. Basic interpretation by participants in the workshop was that when in doubt assume the work was included.

7. Range, wildlife, and fish research scientists identifed the following major research thrusts for 1985 by priority (Task 5):

   a. Determine wildlife and fish species habitat requirements and relations, especially nongame species.

   b. Develop methods to assess the impacts of alternative land uses and management practices on the wildlife and fish resources (interactions/tradeoffs).

   c. Develop methods to describe the wildlife and fish resources in riparian habitats and methods to manage these habitats.

   d. Develop wildlife and timber management guidelines.

RECOMMENDATIONS

1. There is an opportunity for the Forest Service to reemphasize coordination among research work units in range, wildlife, and fish especially those involving ecological similarities. This would, in many cases, involve inter-Station exchanges. Thus, we recommend that the work group concept established at the workshop be continued as one method to effectuate improved coordination. An annual meeting, involving Station administrators and work unit leaders, scientists, cooperators, and customers, should be convened to spend one to two days in discussing the current program, problem selections, and progress. We believe this is an effective way to coordinate ongoing and future research as well as to insure timely transfer of new technology and focus the problem selection process on current high priority problems. This would also enhance information transfer and identification of high priority initiatives for the future.

2. A national range, wildlife, and fish research workshop should be scheduled for FY 1981. The format for the workshop should follow the general structure of the 1978 meeting.

3. Stations and WO should develop budget initiatives for each of the program items identified as major thrusts for 1985.

APPENDIX 1

FISH, WILDLIFE AND RANGE RESEARCH WORKSHOP
November 28 - December 1, 1978

Work Group Report #1

Wallmo, O. C.	FS-PNW, Juneau, AK

Work Group Report #2

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Work Group Report #3

Aldon, Earl F	FS-RM, Albuquerque, NM
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Holmgren, Ralph	FS-INT, Provo, UT
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Work Group Report #4

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Work Group Report #5

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Evans, Keith	FS-NC, Columbia, MO
Gill, John	FS-NE, Morgantown, WV
Harshbarger, T. J.	FS-SE, Franklin, NC
Holt, Coleman	FS-NE, Berea, KY
Ohmann, Lewis	FS-NC, St. Paul, MN

Work Group Report #6

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Moore, William H.	FS-SE, Gainesville, FL
Morse, William B.	WMI, Portland, OR
Ralph, C. J.	IPIF, Honolulu, HI

Other Participants

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APPENDIX 2

Selected Problem Statements

WORKGROUP 1

PNW-1652 (Juneau, Alaska)

Problem 1: The Western hemlock-Sitka spruce forest type is capable of high timber production. Natural regeneration is not a serious problem on most sites. Timber harvesting by clearcutting may accelerate debris flows because soil shear strength is reduced when root systems decay. Landslides and debris flows may cause sedimentation of streams, reduce site productivity, and delay regeneration. Some valuable commercial forests occur on landslide--susceptible slopes. Alternatives to present methods of timber harvest must be found for these areas. Management practices within the forest ecosystems of coastal Alaska must recognize the vital need to protect the associated resources of water, fish, wildlife, and recreational opportunities. Special measures may be required to avoid windthrow in timbered strips that are left adjacent to some streams for protecting fish habitat. Insuring soil stability may restrict harvesting in some areas and require more advanced logging systems in others. Thus there is a need for improved and alternative silvicultural practices that will protect the timber and related resources.

Problem 2: The public demand to maintain or increase populations of big game species such as deer, bear, mountain goats, and moose makes it imperative that timber harvesting and associated activities be planned to maximize ecological benefits and minimize detriments of their habitat. Therefore, it is essential to determine the habitat requirements of selected species of wildlife and develop recommendations for adapting forest management practices to their habitat needs.

PNW-4201 (Portland, Oregon)

Problem 1: A changing timber supply situation coupled with the absence of adequate techniques for analyzing and scheduling timber management activities, underscores the need for research output from this work unit. In the past, when most raw material came from old-growth stands, forest managers gave little attention to investment in timber gtowing. The situation is rapidly changing as evidenced by the fact that large industrial owners and public forest management agencies are investing considerable sums of money in forest regeneration and cultural practices. Intensive forest practices including precommercial and commercial thinning and fertilization open up a whole host of management

alternatives. Much research effort is needed in order to provide forest managers in the Pacific Northwest with economic techniques for analyzing and scheduling various timber management activities for optimum results.

Problem 2: The growing concern for environmental quality and for ensuring maximum total public benefits from the management of forest lands greatly complicates timber investment analyses inasmuch as we are currently unable to adequately relate timber management decisions to the production of nontimber goods and services from forest lands. Conflicts--real or imagined--between timber production and recreational and esthetic values have and will continue to place the burden of proof on the shoulders of public foresters to show why any chosen plan of management is to be preferred for a given area. For this reason, we need to develop economic optimizing models which expressly relate timber and nontimber management activities.

Problem 3: The analytical tools available for planning future management activities have not been perfected. Techniques used to calculate and schedule future timber harvesting and to project future timber supplies have severe shortcomings. Especially imaginative approaches are needed to solve the unique planning problems that characterize the present old-growth conversion period. Data resources and analytical techniques must be developed together if forward-looking questions posed by public budget makers and private investors are to be adequately answered.

PNW-1251 (Corvallis, Oregon)

Problem 1: Complete initial research on management techniques for maintaining and improving existing huckleberry fields and initiate a comparative analysis of relative value of various habitats for production of huckleberries and other products.

PNW-1653 (Corvallis, Oregon)

Problem 1: Streams in the forest of the Pacific Northwest are the spawning and rearing grounds for an important anadromous fish resource which supports a significant commercial and sport fishing industry as well as exciting recreation for thousands of fishermen. Maintenance or improvement of habitat is essential to the continued productivity of anadromous fish-producing streams. Land management practices can affect sedimentation, streambed gravel condition, water level and temperature, and a wide range of water quality indicies. We believe streamside vegetation can modulate these effects, but quantification of this interaction is lacking. The importance of small streams in anadromous fish production has only recently been recognized; protection of these streams depends on their identification early in the land planning

process. For sound management regulation alike, we need to determine the importance of streamside vegetation in maintaining anadromous fish habitat and develop methods for identifying highly productive forest streams.

PSW-1651 (Arcata, California)

Problem 1: Logging is frequently identified with deterioration of fish habitat and scenic beauty. In spite of the intensity of competition for resource use in the northern coastal area, relatively little research has been conducted to gain a better understanding of resource conflicts or to identify the effect of timber management on competing resource values. We lack understanding of soil stability as related to timber harvesting and culture.

WORKGROUP 2:

PNW-1701 (La Grande, Oregon)

Problem 1: Forage available to deer and elk on winter range limits the ability of the habitat in eastern Oregon and Washington to produce increased numbers of these animals or, in many cases, maintain present levels where winter ranges are being lost to other land uses. In either case, continued production of deer and elk at or above present numbers requires us to improve carrying capacity for wild unqulates on winter range.

Problem 2: The amount of forage available on summer ranges limits cattle production. The summer ranges are jointly occupied by deer and elk. If livestock output from seasonal ranges is to be increased, or even maintained in some cases, it is necessary to increase livestock forage on summer range while maintaining habitat for deer and elk, with regard for timber and watershed values.

Problem 3: It will be necessary to define demands, desires, and preferences of the public for nonconsumptive wildlife use. Guidance of this sort is badly needed to determine best investment of management and research dollars.

Problem 4: Before more than rudimentary management guides can be provided, it will be necessary to define basic habitat requirements of selected nongame wildlife of prairie falcons, pileated woodpeckers, spotten owls, and other species of particular interest to managers to be recommended by the PNW Interagency Committee on Rare and Endangered Species. Because of the almost total preoccupation of wildlife biologists with game species and the predilection of ornithologists and

mammalogists to ignore species-habitat interactions, such knowledge is lacking for most species. Rare and endangered species are of particular interest.

Problem 5: One of the most important facets of this problem is the increased, nonhunting contacts between man and ungulate wildlife for recreational purposes. Thus, it is important to test fertilizer use as a means of attracting deer and elk to areas suitable for public viewing.

PNW-1704 (La Grande, Oregon)

Validation resource output levels will be fed into the national model (FREPAS) and used to adjust overall program direction as capabilities are redefined. Results will also be analyzed and reported for immediate use throughout the regional forest-range areas. A "General Project Plan" prepared by the Research and Development team outlines the broad framework for resource inventory, practice implementation, research monitoring and reporting. Within this broad guide, the Research Work Unit will:

Problem 1: Plan, program and reassess the year to year application of practices to increase grazing output.

Problem 2: Develop management strategies to meet future production goals after strategies are implemented, it will,

Problem 3: assess environmental impacts to prescribe level of use constraints; then, using dollar input and forage value output,

Problem 4: calculate the economic return from the several levels of resource utilization and,

Problem 5: assess the social benefits of advanced management strategies.

INT-1705 (Missoula, Montana)

Problem 1: Can habitat diversity and stability be described and validated as positive management prescriptions for wildlife?

This research will identify and define the components of habitat diversity and juxtaposition important to wildlife and incorporate them in a model framework of vegetation dynamics predicted by forest succession development patterns.

Problem 2: Can habitat preferences and habitat selection by grizzly bears be described as management prescriptions?

This research will identify and quantify the components of forest habitat that determine grizzly bear population levels and examine the effects of management on bear behavior. The grizzly bear is identified as a separate problem because this research represents Forest Service participation in the Cooperative Interagency Grizzly Bear Study (Yellowstone).

INT-1651 (Boise, Idaho)

Problem 1: Administrators responsible for managing Batholith lands are faced with a dilemma: On one hand, they receive constant pressure from various interest groups to use the valuable Batholith resources, and yet, on the other hand, they are aware of the serious consequences that can result. It is presently impossible to predict the onsite and offsite effects of disturbances including logging and the attendant road construction, grazing, and fire. This poses a crucial problem to the land manager because he is unable to define limitations to use, if and how management practices might be applied, and possible trade-offs in the various uses and values.

Problem 2: In addition to being able to predict the environmental effects of land uses, research is urgently needed to utilize existing methods to develop new methods to ameliorate adverse effects of disturbances by logging, fire, or grazing. Some statistics from the Boise National Forest (comprising approximately 25% of the total area of the Batholith) illustrate the magnitude of the problem.

Problem 3: Estimated Areas of Disturbance on the Boise National Forest Caused by Various Land Uses

Use	Area to date - mi.2	Estimated annual increase in area in the future-mi.
Road construction (Total length)	29.8 (5,000 mi.)	1.0 (200 mi.)
Logging	58.0	1.5
Grazing	147.0 1/	0 2/
Wildlife	—	4.0
Controlled burn	—	6.4
Total	234.8	12.9

1/ Represents only the area above Arrowrock Dam in the Boise River drainage. This is 28% of the total area of the Boise N.F.

2/ Good range management practices should result in no increase and possibly an annual decrease.

INT-1751 (Logan, Utah)

Problem 1. What are the Biotic and Resource Potentials of Mountain Grasslands?

The habitat-type concept developed by R. Daubenmire for the vegetation of eastern Washington and northern Idaho has proven a valuable approach to wildland classification in the Northwest. It has gained general acceptance for effective land management as a highly useful method for classifying lands according to site potential and is an integral part of the "ecoclass" method for classifying ecosystem proposed for Forest Service use. Research Work Unit 1751 is currently developing a habitat-type classification for natural occurring grasslands and shrublands in the northern Rocky Mountains. Completion of a tentative classification for western Montana is expected by July 1974, and this subsequently will be refined through field testing by researchers and users.

WORKGROUP 3

RM-1710 (Tempe, Arizona)

Problem 1: Means are needed whereby resource managers can use existing knowledge, augmented as necessary by new information, to: (a) readily and accurately place resource areas into habitat quality classes for deer and elf, (b) determine actions necessary effecting change in quality class to attain management objectives, and (c) predict responses of habitats to management alternatives. Research should therefore be conducted to solve the problem: Lack of specific guidelines for qualitatively classifying mule deer and elk habitats in ponderosa pine, mixed conifer, and pinyon-juniper types.

Problem 2: While interest in game species has remained high, recent increases in environmental awareness have been accompanied by an upswing in concern for nongame species, particularly birds. Information is especially needed with regard to impacts of timber-stand manipulation on density and diversity of nongame bird populations. Solution of the problem: Inadequate guidelines for qualitatively classifying small game and nongame bird habitats in ponderosa pine and mixed conifer forests will provide much of the knowledge needed as a foundation for improved habitat management in the Southwest.

Problem 3: The Secretary of the Interior has designated as endangered a number of wildlife species that inhabit forests and associated lands of the Southwest. Plans are currently being formulated for actions necessary to assure recovery by these species to a reasonably safe status. In most cases, however, specific reasons for the decline of the various

endangered species are either unknown or are not well understood. Before appreciable progress can be made toward recovery, therefore, research must be conducted to solve the problem: Lack of information necessary to restore and maintain habitats for endangered or threatened wildlife on southwestern forests and rangelands.

PSW-1701/PSW-1702 (Fresno, California)

Problem 1: This is our situation in the annual-plant zone. Research has been carried on at the San Joaquin Experimental Range since the mid-1930's. Results have included many improved guidelines for grazing management. However, there are two aspects of the annual-plant zone where knowledge is inadequate. We need a final test of our recommended fertilization and grazing management for annual-plant ranges, in terms of both herbage production and its effective use in livestock production.

Problem 2: There are also some important gaps in our holistic understanding of annual-grass ecosystems. Specifically, information is lacking or inadequate for decomposers, insects, small mammals (rodents), birds, and (in the Woodland-Grass sub-zone) scattered overstory oaks and digger pine as they relate to herbage production and site capability. Ranch ponds are common in parts of the zone, but no one has looked at their place in the ecosystems.

Problem 3: In the upper Sierra meadows, we have only limited ecological knowledge at present. Most high meadows were heavily grazed in the past and many are currently under heavy use from recreationists and their pack animals. Deterioration is serious in many meadows. There is increasing demand that recreation and wildlife use be given top priority, but evidence also suggests that controlled grazing--whether by packstock or animals under commercial permit--may be a useful tool for maintaining meadows in condition for optimum multiple use. We have some knowledge of relationships between ecosystems and their use, but we cannot as yet translate it into cultural guidelines to halt and to reverse meadow deterioration.

Problem 4: There is evidence that a dynamic ecological tension exists between small meadows and surrounding forest, particularly lodgepole pine. It also appears that the trend has favored trees in recent decades, with resulting deterioration of wildlife habitat and aesthetic values. But we do not have adequate procedures for restoration of small meadow openings; these are badly needed to reverse the trend and thus maintain the varied ecosystem required for a healthy, rich biota and maximum opportunity for multiple use.

Problem 5: Typical of problems crossing several vegetation zones are those involving the migratory deer herds of the Sierra west slope. The

herds have generally deteriorated in recent years. Causes are undoubtedly varied: the limiting factor for one herd may be different from that of its neighbor. The immediate cause of herd deterioration is thought to be poor fawn crops, poor fawn survival, or both, but there is considerable evidence that habitat deficiencies are either directly or indirectly responsible for the fawn problem. Our immediate problem is, we do not know which habitat factors are most critical in limiting west side deer herds.

INT-1752 (Provo, Utah)

Problem 1: Shrubs are extremely variable in form, with more than 1,000 species growing naturally on wildlands in the West. More than this may grow on comparable areas in other parts of the world. Our preliminary investigations with several promising shrubs have revealed considerable variation within and between natural populations with regard to such values, insect and disease resistance, and tolerance to adverse soils and climates. Progress toward effective use of shrubs and a few trees will require selection of the best species, subspecies, and ecotypes for particular purposes, with the eventual goal of combining outstanding traits through hybridization.

Problem 2: Making superior shrubs available for improvement of wildlands and recreation areas will require immediate solutions to the problems of seed technology, nursery stock production, and efficient planting procedures.

Problem 3: Little attention has been given to insect and disease problems of wildland shrubs. To achieve the optimum recreation, watershed, and wildlife potential of our forest and range revegetation efforts, it will be necessary to understand insect and disease ecology and to develop biologically sound and economically feasible preventive or control measures. Beneficial aspects of insects and diseases should not be overlooked, and research should consider their total ecological effects as a basis for management decisions.

Problem 4: A special effort will be required to determine suitable shrubs and trees, and their culture, for recreation areas on public lands. Since trees were not growing on many of these areas at the time of development, adapted forms for shade and beautification must be found. In conjunction with this, cultural regimes must be developed for planting and management, including application of water, fertilizer, mulches, and pruning.

INT-1703 (Provo, Utah)

Problem 1: Refine ecological classifications and determine productivity potentials of plant communities and species.

Problem 2: Inventory and describe wildlife populations and their influences in the ecosystem.

Problem 3: Develop management systems for optimum livestock production which will maintain or improve the plant-soil resource.

RM-1651 (Albuquerque, New Mexico)

Problem 1: Research obviously needs to be directed specifically toward the spoil rehabilitation difficulties that are peculiar to the arid Southwest. Means are needed to protect spoils against wind and water erosion, to minimize stream and soil pollution by mine wastes, to enhance scenic values of mined sites, and to restore productivity of the land for grazing, wildlife production, and other uses. A major contribution to the overall solution would be to devise methods to establish and maintain vegetal cover on mine spoils.

Problem 2: External physical features, internal arrangement of growth-support media, and chemical properties of spoil materials will no doubt influence the susceptibility of spoils to erosion and the environment of plant life occupying mined areas. Successful rehabilitation may therefore depend, to a large measure, on information derived through research to design spoil banks to maximize stability, limit runoff, and enhance cover development.

INT-1753 (Reno, Nevada)

Problems 1 & 2: Considerable variation in species composition, productivity, and resource potential exists in the pinyon-juniper type because of variation in climate, soils, geology, and past land use. Partitioning of this type into units of relatively similar biotic potential (habitat types) is a prerequisite to orderly progress in both research and management. Once habitat types are defined, the resource potentials (water, forage, wildlife, wood products, esthetics, etc.) need to be quantified (Problem 1). The next step is to determine how these types respond to management alternative (Problem 2).

WORKGROUP 4

RM-1752 (Rapid City, South Dakota)

Problem 1: The national grasslands areas are highly valued for wildlife habitat--including aquatic habitat--and stable watersheds as well as for their minerals and agronomic uses. Practices for the reclamation of the surface mining areas for agronomic purposes such as forage production for livestock and small grain farming have been partially developed. Little is known on how to reestablish shrubs and trees on mine spoils or the development of mine water impoundments to provide the best possible waterfowl habitat. Consequently, land managers lack refined techniques for revegetating mine spoils to enhance habitat for nongame birds, deer, small mammals, and waterfowl.

Problem 2: Even though it is commonly thought woody vegetation in the draws should be maintained or restored, information is lacking which describes and quantifies the use of wooded draws by livestock, deer, and wintering nongame birds. Management guidelines are also needed to insure regeneration of the woody species.

Problem 3: Much research has been done on the culture of ponderosa pine forests in the Black Hills. Forest managers need to know effects of more intensive timber management practices on understory and overstory vegetation and on water yield and quality. Demands on water, wildlife, and recreation and other forest land products are increasing. Managers must be able to prescribe more intensive forest culture, not only for greater timber growth and yields, but also in terms of specific prescriptions for wildlife habitat, animal populations, and water production.

RM-1712 (Laramie, Wyoming)

Problem 1: Transportation systems superimposed upon wildlife habitats throughout the West often materially alter normal wildlife movements and behavior. Research is needed to determine the movements, habits, and other behavioral characteristics of big game in the vicinity of road systems of various standards and develop methods to mitigate unfavorable effects of these developments.

Problem 2: The effect upon the resident big game population of various timber harvest practices can only be surmised at present. Research is needed to determine patterns of big game behavior and movements following timber harvest and activities related to increased human ingress. Land managers need guidelines in the management of these areas, especially as they relate to wildlife, while tree reestablishment is taking place.

Problem 3: Surface mining is the most efficient method of coal production, and tonnage mined in this manner will increase in the future. By its very nature, surface mining impacts the surface resources, particularly on the mined areas themselves, but also through water and air pollution and the increased human activities which are a consequence of increased mining activity on areas away from the actual operations. Baseline ecological guidelines are lacking as to what constitutes adequate restoration of surface mined areas within the comparative framework of the ecological conditions which existed prior to mining, and methods of rehabilitation of mine spoils at high elevations need to be investigated.

RM-1251 (Ft. Collins, Colorado)

Problem 1: Subalpine coniferous forests produce large, but not unlimited, amounts of water used not only locally but as far away as Mexico. The area has become nationally famous for winter sports and summer recreation; it supports extensive stands of timber, and provides habitat and forage for a wide variety of animals. Research and development of resources in the area have been largely single-use oriented. Some of the knowledge necessary for understanding the response of each resource and, in a few cases, some knowledge of the interactions between resources is now available. However, there is a need to develop systems for integrating available and newly developed information in order to facilitate decisions affecting land use.

Problem 2: Much of the subalpine coniferous forests is spruce-fir of varying stand structures. These forests are highly productive, but management decisions require the ability to predict growth and yield of spruce-fir and associated vegetation.

Problem 3: Water, timber, and forage are primary products of the subalpine forests and there are pronounced interactions between them. Some of these interactions are known, but land managers must be able to predict effects of timber harvesting practices on big game habitat, on yield and quality of water, and on associated vegetation.

RM-1751 (Ft. Collins, Colorado)

Problem 1: The influx of people into the Montane Forest results in greater interactions between people and the populations of diverse wildlife that reside there. The interaction in bidirectional, and the total interaction is in need of study. However, the most immediate problem is that of determining the effects of home building and recreational development on game and nongame animal populations.

Problem 2: Most of the Montane Zone is underlain by granite that weathers to form very porous, highly erodible soils. Any activity of man must be done with consideration of the possibility of reduced water quality through erosion and combine to make restoration a very slow process. There is, therefore, a great need for determining the effects of second home and recreational development on water quality.

Problem 3: The vegetation complex of the Montain Zone is the home for a myriad of animals, including man. Land managers and land use planners must be capable of predicting structure, growth, and yield of irregular forest stands and associated vegetation.

Problem 4: Land managers and land use planners cannot hope to deal with complex mixtures of resources, increasing demands, and problem planning with past procedures. Managers need up-to-date information on the current status of their resources and reasonable estimates of possible long term changes. In a parallel situation with other business managers, they have a need for systems for integrating available and newly developed information to facilitate decisions affecting land use. They need what, from their viewpoint, are simple ways of examining the probable effects on several resources of various possible management alternatives.

RM-4151 (Ft. Collins, Colorado)

Problem 1: With few exceptions, current resources inventory procedures and resource evaluation processes have traditionally been fragmented within and among natural resource agencies to meet specific functional objectives. Consequently, a comprehensive multiresource national assessment of the state-of-the-Nation's renewable resources is difficult and imprecise. Many factors contribute to the dilema including the lack of: (1) a land and resource classification system amenable to hierarchical aggregation and disaggragation of resource values, (2) quick and efficient resource inventory procedures responsive to near real-time updating of the resource situation, (3) adequate techniques for analyzing the data once it is available, and (4) readily accessible data storage and retrieval systems. Therefore, a Research and Development Program was established at the Rocky Mountain Forest and Range Experiment Station to provide the required research and development to meet these needs for multiresource inventory and evaluation techniques.

WORKGROUP 5

NE-1151 (Orono, Massachusetts)

Problem 1: A problem related both to within-stand silviculture and to any inclusive forest management policy is the inability to predict with accuracy the response of wildlife populations to forest modifications or direct habitat improvement. The results of habitat improvement practices, silviculture, and forest management prescriptions targeted for a particular species of wildlife are known only in a general sense. The problem is primarily one of determining the potential of the land to support wildlife on definable site units subject to alternative silvicultural and direct habitat management prescriptions, forest management policies, spruce budworm damage, and subsequent control efforts.

NE-1751 (Amherst, Massachusetts)

Problem 1: Although urban residents apparently desire to visit, own, and live on wooded land, little is known about the visual attribute that landowners and visitors perceive and seek to perpetuate. Concern has been expressed for the loss of scenic variety associated with urbanization, but there is a lack of techniques for quantifying scenic qualities of forest vegetation in urban environments. Management guidelines are needed to retain and enhance the scenic qualities of urban forest vegetation, but first, some agreement must be reached on what is considered scenic and such agreement must be defined in objective or quantitative terms.

Problem 2: As compared with game species, the number of nongame species is much greater, their habitat requirements more diverse, and many of them can exist in urban areas. If desirable human contact with wildlife species in urban areas is to be increased, three interlocking problems must be solved: Inadequate understanding of wildlife habitat requirements for nongame species, inadequate techniques for measuring human preference for wildlife species, and inadequate management practices for maintaining wildlife in urban areas.

Problem 3: Research is needed to evaluate the benefits of urban forest land so that they can be compared with economic benefits normally associated with urban expansion. There is presently a lack of techniques for integrating the scenic, recreation, and wildlife values of urban forests for land use decisionmaking.

NE-1152 (Warren, Pennsylvania)

Problem 1: One of the major problems limiting full use of the Cherry-maple and oak maturing forests is inadequate regeneration following harvest cutting and natural catastrophies. Solutions to the regeneration problem are essential to maintain these lands in productive forest cover and to permit forest harvesting to continue at planned levels.

Problem 2: A closely related problem is the overbrowsed deer range that has resulted from the maintenance of a large deer herd. Excessive browsing has been shown to be the major factor responsible for failure of seedling regeneration, and has greatly reduced the amount of favorable habitat for such other wildlife species as rabbits, hares, grouse, and turkey.

Problem 3: A third major problem is the lack of guidelines for culture and management of existing stands.

NC-1702 (St. Paul, Minnesota)

Problem 1: Through Act of Congress (Public Law 93-205) the specific value of land as habitat for endangered and threatened wildlife species has been declared of paramount importance in areas deemed "critical habitat" for each of those so designated. Managers are obligated to promote the conservation of such species by maintaining and/or restoring viable population levels within the "critical habitat." To meet this obligation within the northern Lake States Region, there is a need to identify and evaluate management alternatives that will ensure adequate habitat (food and shelter) to produce and/or maintain viable populations of the Eastern Timber Wolf and Kietland's Warbler within their "critical habitats."

Problem 2: There is a need to assess the ecological consequences of management alternatives for the aspen-birch-conifer ecosystem in terms of effect on representative wildlife food chains, especially those containing nongame, rare, and unique species.

Problem 3: The productivity of prairie potholes has been ascribed to the naturally occurring wet-dry cycles that release nutrients trapped in bottom muds during dry years so that when they refill, the production of plants and invertebrates is increased. Water impoundment ecosystems are highly variable and their management uncertain because vertebrate, invertebrate, plant, and water quality responses to major water table fluctuations are unknown. There is a need to extend this research to include information on the response of vertebrates to water level management of these impoundments. Specifically, there is a need to assess the ecological consequences of impoundment characteristics and management alternatives necessary to produce habitat to increase vertebrate density and diversity.

NC-1701 (Columbia, Missouri)

Problem 1: The Forest Service has developed a national research program that emphasized development of techniques to guide management projects that will halt loss of numbers and restore or maintain viable populations of endangered species within their areas of critical habitat. The Indiana bat (Myotis sodalis), gray bat (Myotis grisescens), and bald eagle (Haliaeetus leucocephalus) are the endangered species occurring in the central oak-hickory forest. At present, a lack of information on critical habitats and life requirements of the Indiana bat, gray bat, and bald eagle prevents the development of management plans to safeguard these species.

Problem 2: Several plant and animal species occurring in the Ozarks are currently high priority research subjects because of their tenuous existence of their uniqueness even though not now officially classified as endangered by the Department of the Interior. Land managers, especially public land managers, are trying to locate, identify, and protect these rare and unique species. Currently, a lack of information on the location and identification of sensitive plant and animal species prevents the development of management plans to safeguard them.

Problem 3: To understand how specific changes in land use affect avian habitats, we must understand the forest ecosystem rather than simply react to symptoms of change. However, ecosystem management plans cannot now be developed because of inadequate information on the effects of silvicultural treatments on critical habitat components for nongame birds.

Problem 4: The glades of the White River watershed (approximately 500,000 acres) represent an unique ecosystem. Past land use practices including livestock grazing and fire suppression have produced conditions that favor the increase of eastern redcedar and promote other structural changes in the vegetation. The lack of information on fire and grazing impacts (or the absence of these factors) on nongame wildlife in the glade community prevents the land manager from formulating sound management plans.

NE-1702 (Morgantown, West Virginia)

Problem 1: About 60 species of birds and mammals use tree cavities for nesting, escaping, loafing, or food caching. Socially or ecologically, the most important species are gray and fox squirrels, raccoons, woodpeckers, and other cavity excavators. Better methods are needed for

integrating habitat management for tree-cavity-users with management of other forest resources. The premium value of large trees in an area where most stands are less than 60 years old is central to the problem of providing tree cavities or equivalents as shelter for wildlife.

Problem 2: Like tree squirrels and some of the other cavity users, wild turkeys are associated with older growth stands and are sensitive to certain key habitat conditions. Special management efforts may be required to provide winter and brood-rearing habitat for wild turkeys.

Problem 3: Many of the shrub and woody vine species have comparable but different values aesthetically and as compontents of wildlife habitat. The general relationships among undergrowth and other elements of forest ecosystems are fairly well known but there have been fewer studies in the Northwest than in the South and West. Here, more specific information is needed for managing forest undergrowth for diverstiy of wildlife species and aesthetic qualities.

SE-1651 (Franklin, North Carolina)

Problem 1: Lack of Information on the Chemical and Physical Characterisitics and Biological Interactions that Determine Productivity of Trout Streams. Production of trout biomass is of primary interest and is dependent on available food, physical characteristics of the habitat, and the chemical composition of water. During the next 5 years, two major studies will concentrate on isolating factors that limit trout production and on developing techniques that mitigate these factors.

Some limitations to trout production such as erosion and stream siltation are already known. We seek to quantify the effects of different levels of sedimentation on the food chain and trout populations. One study involves relating substrate particle size, dissolved oxygen content, and water flow rates in intragravel waters of undisturbed and disturbed streams to successful egg and alevin development. Lack of cover also limits trout, and effects of artificial cover on trout populations will be studied. Removals of debris to improve hydrologic performance of streams or to improve habitat conditions is commonly practiced, and effects of this practice on aquatic insects and trout populations will be documented.

Other studies involve determining the effects of flood flows and channel scour on habitats and aquatic communities and of an impoundment and sewage input on trout populations in the stream below.

WORKGROUP 6

SO-1701 (Alexandria, Louisiana)

Problem 1: The most drastic changes in forest vegetation usually occur between final harvest cut of timber and crown closure of the regenerated stand. Timber management measures are intensifiying in an effort to produce the timber needs of the year 2000, as projected on the Outlook for Timber in the United States (1973). Site-preparation methods that are being devised as components of such intensive silvicultural programs will often destroy or drastically modify the forest floor and the minor vegetation that remains after final harvest. Such practices, not only amplify the vegetal changes during the regeneration period, but may exert pronounced influences on the understory for a considerable portion of the timber rotation. Toward providing the information needed to select practices that will best attain timber-livestock-wildlife objectives, investigations will be conducted to quantify understory response to site preparation measures in intensive culture of pines.

Problem 2: Density of the overstory is the most powerful force influencing the capacity of most forest sites to produce food for livestock and wildlife. Judicious planning for use of food resources by livestock and wildlife throughout a timber rotation requires a thorough understanding of overstory--understory relationships and dynamics. Such knowledge will be derived, to a large measure, through research to determine for pine and pine-hardwood forests the effects of overstory density on herbage and browse.

Problem 3: Methods for managing cattle and forage must be selected judiciously if beef is to be produced efficiently on forest range. Herd performance is but one criterion for judging suitability of such methods. Long term productivity of the ecosystem and maintenance of timber, wildlife habitat, and other forest resource values also warrant consideration. To expand the information needed to develop forest grazing programs, study will be conducted to assess impacts of range management practices on understory vegetation and forest regeneration.

Problem 4: Controversy has prevailed for many years regarding the use of southern forests as range for livestock. Much of the dispute has centered around the issue of competition for food between cattle and deer. Wildlife interests content that cattle consume large quantities of food needed by deer, especially during winter. Livestock interests counter with the argument that well-managed beef operations not only pose no threat to deer food supplies but that some benefits accrue to deer ranges. Opposing forces are without material specific evidence to support their claims, however, and interrelationships between cattle and deer remain uncertain pending action to determine influences of grazing by cattle on deer habitat.

Problem 1: Food and cover for wildlife are largely influenced by the numbers and kinds of trees in the overstory. At least half of the upland forest area either has too many or the wrong combination of trees to provide optimum conditions for wildlife. And, in many cases, this imbalance in numbers and kinds of trees detracts from timber values. The control of these factors should, therefore, be one of the first and most obvious steps in future silvicultural management. Thus research is needed to quantify the effects of timber stand density and composition on production or food for wildlife, particularly deer and squirrel.

Problem 2: Even-aged management is destined to play a major role in intensive silviculture of pines. The kind, quantity, or quality of food for deer may change markedly from harvest cut to crown closure. The design and distribution of harvest areas will not only affect carrying capacity of the range, but may influence movements of deer as well. Study is needed, therefore, to determine relationships between deer and their food supplies as influenced by harvest cuts.

Problem 3: In addition to silvicultural practices, there is a wide range of possiblities to improve both quantity and quality of food for specific wildlife species. Most of the practices require intensive culture of plants and are usually expensive. Some may enhance timber growth while others may remove land from timber production. In most cases, the actual effect on wildlife and hunting conditions are unknown. Thus, research is needed to asses intensive methods of habitat improvement for deer, squirrel, and turkey. Knowledge developed through such studies and that emerging from TM research of intensive silvicultural measures will provide a basis to formulate alternatives for timber-wildlife production.

Problem 4: To date, wildlife habitat research in the South has concentrated on game species, mainly deer, squirrel, quail, and turkey. Although public concern for game remains high, enthusiasm for other wildlife--especially birds--has recently increased dramatically. Numerous questions have been raised regarding impacts of forestry practices on specific nongame wildlife and on the composition of nongame populations. To provide answers to such queries and to derive information basic to effective management of food and cover resources, study is needed to establish interrelationships between the forest habitat and the endangered and nongame bird species.

In their efforts to obtain "the most for their timberland," forest landowners are turning from the traditional single product, timber, to multiproduct management of their land. Hunting leases, some grazing leases, and special hunting permits are evidence of such attempts to obtain additional benefits from forest land. Multiproduct management of the forest will be more difficult because of the variability and complex

interrelationships of the components of the forest ecosystem. Good information is available for single-product management, especially timber, of southern forests but lack of knowledge will hamper plans for intensive management of the forests of the Southeastern Coastal Plain for outputs for forage and livestock in conjunction with the traditional product, timber.

SE-1702 (Clemson, South Carolina)

Problem 1: The Bachman's Warbler is considered by many authorities as the rarest songbird in North America. Little is known about its present status, habitat, requirements, or life history. Some authorities believe that the species may already be extinct, while others believe it still exists but in such low numbers in remote habitats that it escapes detection. Immediate effort is needed to determine the distribution and structure of Bachman's Warbler populations in the southern U.S.

Problem 2: The Red-cockaded Woodpecker exists in scattered, apparently viable populations, in several areas of the southern U.S., and in certain areas, is abundant enough to be considered common. The species is listed as endangered, however, because its preferred habitat, old-growth stands of southern pine, has steadily diminished as timber management has become more intensive and rotations shortened. Before managers can assess or predict the effects of alternative forest management strategies on woodpecker populations, research is needed to determine the essential habitat elements selected by Red-cockaded Woodpeckers.

Problem 3: As an endangered species, the Red-cockaded Woodpecker is having a considerable impact in limiting forest management options, especially on public forest lands. If management is successful in protecting and perpetuating woodpecker populations at acceptable levels, it may be desirable to reclassify the habitat requirements. It should be possible to utilize forest survey data systems to estimate distribution, condition, and trends of Red-cockaded Woodpecker habitats throughout the South. To do so would provide the first objective assessment of the species rangewide status and potential for recovery.

SE-1153 (Gainesville, Florida)

Problem 1: Forest management aimed at accelerating fiber production is affecting wildlife. Some wildlife benefit from cut-plant forestry and rest-rotation grazing; others are harmed. If suitable wildlife habitat is to be available, land managers must have guidelines and management alternatives that integrate wildlife management with timber management and with forage production. Development of these guidelines is presently hampered by an inadequate understanding of the influence forest and range management practices have on wildlife habitat.

Problem 2: Many short-range and most long-range overstory responses to such practices as: Site preparation using machines, fire, and chemicals; whole tree harvesting; and grazing under various systems of management are not well understood. Understanding is hampered by a lack of sensitive, comprehensive models of the overstory response to cultural practices.

PSW-1752 (Honolulu, Hawaii)

With official designation of endangered and threatened plants, insects, and mollusks of future certainty, management options and activities on public lands and private lands receiving public funding will probably be severely restricted. Some 900 Hawaiian plant species, subspecies, and varieties have been proposed for listing in accordance with the Endangered Species Act of 1973. Identification of critical habitat for each endangered and threatened species already is imperative if effective multiple-use management of Hawaii's forest is to continue. In Hawaii, 20 epidemic forest birds have been listed as endangered.

Problem 1: Scientists and resources managers at all levels of government, and in the private sector as well, agree that there is a severe lack of knowledge about habitat requirements of the endangered endemic Hawaiian forest birds, and the lack of information is hindering development and initiation of protection and recovery programs for these species.

Problem 2: Protecting Hawaii's forest and wildlands from wildfire is becoming increasingly more important as demands on and plans for these lands increase. The relationship between fire occurrence and the vigor and spread of exotic species is poorly understood but presents a serious barrier to maintenance of several native ecosystems. Although a fire danger rating sytem, adapted from the National Fire Danger Rating System at IPIF, is in use by the Hawaii Division of Forestry, little is known about local fire danger and predicting fire behavior in Hawaii's unique fuel-wheather-topography complex.

Problem 3: Land use activities, competition from exotic plants, feral animals, and diseases and insects are reducing the area and altering the composition of koa, ohia, and other native forests. These important watershed cover types, which contain a diversity of valuable resources, have received only fragmentary study until recently. Consequently, forest resource managers are faced with a serious lack of knowledge about the dynamic ecology of the important Hawaiian forest communities (ecosystems), particularly the koa forests and the declining ohia-koa-treefern forests, on which to base management guidelines.

Problem 4: The mamane-naio forest ecosystem, which includes about 54,000 acres of Mauna Kea, has been overbrowsed by feral sheep and domestic cattle for over 100 years. Forest decline and habitat degradation have been severe with 21 endemic Hawaiian species or subspecies of plants tentatively listed as threatened, endangered, or extinct. Restoration of the palila to nonendangered status may hinge primarily on preventing further degradation and on effective rehabilitation and management of the ecosystem. At present, resource managers at State and Federal levels and scientists agree that there is inadequate knowledge for designing effective rehabilitation and management guidelines for the declining mamane-naio forest ecosystem.

SO-1152 (Rio Piedras, Puerto Rico)

Research on threatened and endangered species:

1. Puerto Rican Parrot
2. Yellow Shouldered Black Bird
3. Puerto Rican Boa

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